

Attorney Docket No.: 131908/11887 (21635-0107-01)
Application No.: 10/662,586

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Remarks

This application has been reviewed in light of the nonfinal Office Action of September 9, 2005. Claims 1-18 are pending, and all claims are rejected. In response, new claims 19-20 are added; and the following remarks are submitted. Reconsideration of this application, as amended, is requested.

Claims 1 and 9 are rejected under 35 USC 103 over Tilman U.S. Patent 5,328,659 in view of ASM Handbook. Applicant traverses this ground of rejection.

The following principle of law applies to all sec. 103 rejections. MPEP 2143.03 provides "To establish prima facie obviousness of a claimed invention, all claim limitations must be taught or suggested by the prior art. *In re Royka*, 490 F2d 981, 180 USPQ 580 (CCPA 1974). All words in a claim must be considered in judging the patentability of that claim against the prior art. *In re Wilson*, 424 F.2d 1382, 1385, 165 USPQ 494, 496 (CCPA 1970)." [emphasis added] That is, to have any expectation of rejecting the claims over a single reference or a combination of references, each limitation must be taught somewhere in the applied prior art. If limitations are not found in any of the applied prior art, the rejection cannot stand. In this case, the applied prior art references clearly do not arguably teach some limitations of the claims.

Claim 1 recites in part:

"solution heat treating the nickel-base superalloy at a solutionizing temperature above a gamma-prime solvus temperature of the nickel-base superalloy; thereafter

first quenching the nickel-base superalloy in a first molten salt bath maintained at a temperature of from the gamma-prime solvus to about 100°F below the gamma-prime solvus temperature; thereafter

second quenching the nickel-base superalloy in a second molten salt bath maintained at a temperature below an aging temperature of the nickel-base superalloy;"

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The explanation of the rejection references col. 2, lines 30-55 of Tilman. Applicant believes that the specific portion of Tilman that is said to teach the above limitation is found at col. 2, lines 39-44:

"Following the solution treatment step, the disk is slow cooled to a temperature somewhat below the gamma prime solvus temperature. Once the article is cooled to the desired temperature below the gamma prime solvus, it can subsequently be cooled to room temperature at a faster rate."

(If Applicant is incorrect in this understanding, clarification is requested.)

This portion of Tilman teaches a two-step cooling approach, but not Applicant's claimed two-step cooling approach. In fact, the quoted portion of Tilman teaches directly contrary to the quoted limitation of claim 1. For the first cooling step, Tilman teaches a "slow cool." The first quenching step of claim 1 is a quench from above the gamma-prime solvus temperature to about 100°F below the gamma prime solvus temperature, not a "slow cool" as taught by Tilman. Further, "a temperature somewhat below the gamma prime solvus temperature" as taught by Tilman is indefinite, and is certainly not a teaching of the recited "about 100°F below the gamma-prime solvus temperature."

For the second cooling step, Tilman teaches cooling "to room temperature at a faster rate." Again, this teaching is indefinite. Neither the cooling rate nor the cooling medium is taught. "A faster rate" could be a water quench, a fan-air quench, an oil quench, or any of a wide variety of approaches that yield a faster rate than the undefined "slow cooled" rate of Tilman's first cooling step.

ASM Handbook does not remedy these failings in the teachings of Tilman. One skilled in the art would not be motivated to use a salt bath quench in the first cooling step of Tilman, which requires a "slow cool." The concept of "quench" (i.e., to cool rapid or suddenly) is antithetical to the concept of "slow cool."

In short, Tilman does not teach the steps of "first quenching" and "second quenching" as recited in claim 1.

Claim 9 depends from claim 1 and incorporates its limitations. The limitations of claim 1 are not taught by the combination of the references for the reasons stated above.

Claim 9 further recites in part:

"...an additional step, after the step of second quenching and before the step of precipitation heat treating, of

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cooling the nickel-base superalloy to room temperature."

The step of second quenching reduced the temperature to "below an aging temperature of the nickel-base superalloy", as recited in claim 1. Now the additional step is cooling to room temperature. In the above quoted teaching of Tilman, there are two steps--the slow cool "to a temperature somewhat below the gamma prime solvus temperature", and then the cooling "to room temperature at a faster rate." In the construction of the rejection of claim 1, the slow cooling of Tilman was analogized to the recited first quench of claim 1, and the faster-rate cooling of Tilman was analogized to the recited second quench of claim 1. To Applicant's understanding, there is no other cooling step of Tilman prior to its precipitation heat treating that could be analogized to the recited step of claim 9.

The rejection of claim 9 is not discussed in the explanation of the rejection. If the rejection is maintained, Applicant asks that the portion of Tilman that is said to teach the recitation of claim 9 be identified.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claims 2-8 and 10-12 are rejected under 35 USC 103 over Tilman in view of ASM Handbook. Applicant traverses this ground of rejection.

Each of claims 2-8 and 10-12 depends from claim 1 and incorporates its limitations. The limitations of claim 1 are not taught by the combination of the references for the reasons stated above, which are incorporated here.

Additionally, claims 2-8 and 10-11 recite specific numerical limitations and claim 12 recites machining, each of which limitations are acknowledged in the Office Action not to be taught by the references.

The explanation of the rejection suggests that these limitations may be disregarded because they "...are considered to be merely workpiece and product characteristics..." These limitations are in fact reflective of specific products that are particularly difficult or impossible to produce using prior processing approaches. For example, regarding claims 2-5 and as stated in para. [0021] of the present application,

"Preferably, the initial article, a gas turbine disk pancake or contoured blank, has a greatest thickness dimension through a section, in at least some portions of the article as shown in Figure 2, of not less than about 3 inches. More preferably, a difference between a greatest section thickness and a

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smallest section thickness is at least about 2 inches. These dimensions and dimensional differences are found to otherwise produce significantly greater problems in the heat treating than smaller dimensions and dimensional differences."

Regarding claims 6-7, para. [0026] states:

"The nickel-base superalloy is preferably maintained in the first molten salt bath for a time of at least about 5 minutes, and more preferably for a time of from about 5 to about 30 minutes. This period in the first molten salt bath allows the temperature within the relatively thick article to partially equilibrate throughout the section."

Regarding claim 8, para. [0027] states:

"The nickel-base superalloy is preferably maintained in the second molten salt bath for a time of at least about 10 minutes. The nickel-base superalloy may be maintained in the second molten salt bath for extended periods of time without harm."

Regarding claim 10, para. [0031] states:

"Optionally, after the step of second quenching 28 and before the next step of precipitation heat treating, the article may be stabilize heat treated at a stabilizing temperature of from about 100°F to about 200°F above the aging temperature, step 32. ...The stabilizing heat treatment aids in relaxing the strains and stresses produced during cooling."

Regarding claim 11, para. [0023] states:

"Preferably, the aged microstructure of the nickel-base superalloy has a volume percentage of gamma-prime phase of at least about 40 percent. This relatively high volume fraction of gamma-prime phase produces excellent mechanical properties in the final product in service, as desired for advanced applications requiring the greatest service performance. However, the high volume fraction of gamma-prime phase reduces the ductility of the nickel-

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base superalloy in intermediate temperature ranges so as to cause heat treating difficulties not found in alloys with lower volume percentages of gamma-prime phase."

In short, the numerical limitations of claims 2-8 and 10-11 are chosen to reflect situations in which the present approach is particularly advantageous.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

Claims 13-18 are rejected under 35 USC 103 over Tilman in view of ASM Handbook, "applied as set forth above." Applicant traverses this ground of rejection.

Claim 13 recites in part:

"solution heat treating the nickel-base superalloy at a solutionizing temperature above about 2030°F; thereafter

first quenching the nickel-base superalloy in a first molten salt bath maintained at a temperature of from about 1930°F to about 2000°F; thereafter

second quenching the nickel-base superalloy in a second molten salt bath maintained at a temperature of from about 900°F to about 1300°F"

Claim 18 recites in part:

"solution heat treating the nickel-base superalloy at a solutionizing temperature of from about 2050°F to about 2150°F; thereafter

first quenching the nickel-base superalloy in a first molten salt bath maintained at a temperature of from about 1930°F to about 2000°F and maintaining the nickel-base superalloy in the first molten salt bath for a time of at least about 5 minutes; thereafter

second quenching the nickel-base superalloy in a second molten salt bath maintained at a temperature of from about 900°F to about 1300°F and maintaining the nickel-base superalloy in the second molten salt bath for a time of at least about 10 minutes;"

These portions of claims 13 and 18 recite the same solution heat treating, first quenching, and second quenching steps as recited in claim 1. These steps are not taught

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by the combination of Tilman and ASM Handbook for the reasons stated above, and which are incorporated here. Specifically, neither reference teaches a first quenching step followed by a second quenching step.

Additionally, claims 13 and 18 recites specific numerical values and/or ranges of the temperatures attained in the three recited steps. The portion of Tilman "applied as set forth above" is col. 2, lines 30-55. This portion of Tilman does not mention a single numerical value of a temperature. There is certainly no teaching of the numerical values of temperature recited in claim 13 found at col. 2, lines 30-55 of Tilman.

Other portions of Tilman do state specific numerical values of temperatures, but Applicant can find no teachings of the numerical values of temperatures recited in claims 13 and 18 in any other portion of Tilman. If the rejection is maintained, Applicant asks that all other locations of Tilman that are relied upon be set forth in the next office action.

Claims 14-17 set forth limitations similar to those respectively found in claims 2, 4, 10, and 11. Applicant incorporates the prior discussion of the rejections of those claims.

Applicant asks that the Examiner reconsider and withdraw this ground of rejection.

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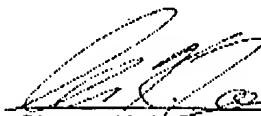
CONCLUSION

For at least the reasons set forth above, Applicant respectfully requests reconsideration of the Application and withdrawal of all outstanding objections and rejections. Applicant respectfully submits that the claims are not rendered obvious by the cited art and thus, are in condition for allowance. Applicant requests allowance of all pending claims in a timely manner. If the Examiner believes that prosecution of this Application could be expedited by a telephone conference, the Examiner is encouraged to contact the Applicant's undersigned representative.

This Response has been filed within three (3) months of the mailing date of the Office Action and it is believed that no fees are due with the filing of this paper. In the event that Applicant is mistaken in these calculations, the Commissioner is hereby authorized to deduct any fees determined by the Patent Office to be due from the undersigned's Deposit Account No. 50-1059.

Dated: November 2, 2005

Respectfully submitted,
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